

EJVES Extra 5, 82–84 (2003)

doi: 10.1016/S1533-3167(03)00048-7, available online at <http://www.sciencedirect.com> on  SCIENCE DIRECT®

SHORT REPORT

Pathological Knee Dislocation in the Morbidly Obese

M. M. Seenath,¹ D. J. Parry,¹ D. Macdonald,² S. G. Pollard³ and D. J. A. Scott^{1*}*Departments of ¹Vascular Surgery, ²Orthopaedics, and ³Bariatric Surgery, St James's University Teaching Hospital, United Leeds Hospital Trust, Leeds LS9 7TF, UK**Key Words: Knee dislocation; Trauma.*

Introduction

Knee dislocation is an uncommon injury that relates to high-energy trauma and may be associated with neurovascular damage. We introduce the term pathological dislocation to describe an injury occurring in a subset of patients, where an intrinsic abnormality rather than an extrinsic force is sufficient to cause loss of tibiofemoral articulation with bicruciate ligament tears or disruption (modified from Schenck).^{1,2} Body weight is not usually recognized as a causative factor, however, morbid obesity may be associated with pathological dislocation, although this is very rare. We present two cases of pathological knee dislocation, with concomitant popliteal artery and nerve damage. Late presentation and delay in diagnosis culminated in eventual lower limb amputation. We have written these case reports to increase vigilance to the risk of popliteal vascular injury in the morbidly obese.

knee was dislocated and she was unable to move the leg and foot. The leg was mottled and cold with severe pain on passive flexion of both the anterior and posterior compartments of the leg. Neurological examination revealed no movement of the knee or ankle and she had a profound sensory deficit below the knee. There were no palpable peripheral pulses and no Doppler signal was obtained from either the posterior tibial or dorsalis pedis arteries. In the light of clinical findings she was immediately taken to theatre where closed reduction was attempted but unsuccessful. Emergency exploration of the right leg was performed and this demonstrated that all the fascial compartments were dead with no muscle twitching or bleeding. On the basis of her poor clinical status a thru knee amputation was performed in preference to above knee. Reactive depression, poor wound healing and severe phantom pain complicated her postoperative period. She remains wheel chair bound, living in sheltered accommodation.

Case 1

A 51-year-old alcoholic afrocaribbean lady slipped and fell while walking on the flat. She managed to get back to bed despite the severe pain in her right leg. She then presented to hospital 20 h following the injury to her right knee. She was unable to bear the weight on the affected limb, and was in considerable pain. At the time of admission she was noted to be a morbidly obese patient (Body Mass Index (BMI) of 40). Her right

Case 2

A 32-year-old lady was taken to Accident and Emergency Department following a fall. She was walking on the level when the right knee suddenly gave way. Ten years previously she had suffered a right knee dislocation without vascular injury, which was managed conservatively. A diagnosis of right knee dislocation, that had subsequently relocated was made and she was transferred to our hospital for further management. On examination she was an obese lady (BMI of 38). Her right knee was swollen

*Corresponding author. Dr D. J. A. Scott, Department of Vascular Surgery, St James's University Teaching Hospital, United Leeds Hospital Trust, Beckett Street, Leeds LS9 7TF, UK.

and tense and the right foot was cold and pulseless. There was numbness on the lateral aspect of the leg and foot and she was unable to move her foot. The left knee demonstrated marked hyperextension.

Radiographs of the knee demonstrated no obvious injury and an intra-arterial digital subtraction angiogram (IADSA) showed popliteal artery occlusion with a single anterior tibial run-off. An immediate four-compartment fasciotomy was performed via medial and lateral incisions. The posterior compartment was swollen and tense with minimal twitch, however, the anterior and lateral compartments were viable. Using the medial approach a superficial femoral to below knee popliteal bypass was performed using contralateral reverse saphenous vein graft. An external fixator was applied to stabilize the knee joint. Within 24 h the graft occluded and at the time of reexploration no predisposing abnormality could be detected. A graft thrombectomy was performed with a vein patch angioplasty to the proximal anastomosis. The plastic surgeons rotated the medial gastrocnemius to cover the distal aspect of the graft (Fig. 1). During the immediate follow up period neurological and electromyographic studies confirmed common peroneal nerve palsy. Her postoperative course was protracted due to problems of wound healing and fixation of the knee joint. Four months later the medial calf and thigh

wound had healed. Continued orthopaedic and plastic surgery review confirmed a major nerve injury and gross instability of the knee joint with failure to weight bear. The consensus advice was to undergo an above knee amputation. Her rehabilitation has been slow. She is to be fitted with a prosthetic limb in the near future.

Discussion

Obesity as defined as a body mass index of greater than 30 kg/m² has now reached epidemic proportions in the United Kingdom, the prevalence having more than doubled since 1980. The condition now affects about 20% of adults and 6–8% of children with approximately 2% of adults in the UK being morbidly obese (BMI > 40, or >35 with comorbidity).³ The association between morbid obesity and mechanical failure of weight bearing joints has been recognized for many years⁴ chiefly from progressive osteoarthritis rather than pathological knee dislocation.

Extreme blunt forces (650–800 psi) can initiate subluxation of the tibia over the femur causing dislocation of the knee.^{5,6} Marin et al⁷ suggested that obese patients put tremendous stress on the knee joint at one particular moment. The supporting ligaments



Fig. 1. Intraoperative photograph showing external fixator in place and exposed gastrocnemius flap.

and soft tissue are unable to sustain the load resulting in an unstable joint, which collapses and dislocates. Work carried out by Kennedy⁸ in cadaver studies demonstrated that at 30° of hyperextension the posterior capsule ruptured and that at 50° significant damage to the popliteal vessels occurred. Arterial injuries occur in 30–50% of knee dislocations^{9,10} with most civilian series quoting a substantial amputation rate of nearly 30%.¹¹

Hagino *et al.*¹² stated that vascular injuries occurred in all patients treated in their series with 43% sustaining combined arterial and venous injury. Both our patients suffered arterial injury. These figures are too small to make any direct comparisons between subgroups of patients, however, the emerging pattern suggests that pathological knee dislocation in the morbidly obese may be associated with higher rates of arterial injury.

Both our patients went on to have lower limb amputations. Hagino¹² stressed that limb salvage and successful rehabilitation could be anticipated. This has not been our experience. In the series discussed by Hagino,¹² two out of seven patients required amputation as definitive management. In our cases, the first patient presented late to the hospital with symptoms and signs consistent with irreversible ischaemia and extensive muscle necrosis. The second had a successful revascularization procedure but eventually lost the limb secondary to neurological damage and gross instability of the knee joint. Wascher¹ cited 16 nerve injuries that occurred in 11 knee dislocations. There were 11 common peroneal nerve and five tibial nerve injuries in the series all secondary to high-energy trauma. All major vascular injuries were associated with peripheral nerve injury. Tomaino *et al.* found peroneal nerve palsy following knee dislocation a serious problem and that neurolysis at the time of knee reconstruction was not always associated with a return to peroneal nerve function.¹³

In conclusion, we wish to stress the devastating nature of this injury. Results of treatment are often unsatisfactory. The best results are likely to be achieved only if those who treat minor/major trauma

are aware of the potential for spontaneous knee dislocation with neurovascular injury. Once the injury is diagnosed the operating team must anticipate a technically demanding procedure in which perioperative preparation is essential. Successful rehabilitation will include attention to obesity related diseases, referral to a dietician and assessment for anti-obesity surgery.

References

- 1 WASCHER DC, DVIRNAK PC, DECOSTER TA. Knee dislocation: initial assessment and implications for treatment. *J Orthop Trauma* 1997; **11**(7): 525–529.
- 2 SCHENCK JR. RC. The dislocated knee. *Instr Course Lect* 1994; **43**: 127–137.
- 3 POLLARD SG. Morbid obesity—a surgeon's perspective. *Curr Anaesth Crit Care* 2001; **12**: 254–260.
- 4 GOLDIN RH, MCADAM L, LOUIE JS *et al.* Clinical and radiologic survey of the incidence of osteoarthritis among obese patients. *Ann Rheum Dis* 1976; **35**: 349–359.
- 5 ROMAN PD, HOPSON CN, ZENNI JR. ED. Traumatic dislocation of the knee: a report of 30 cases and literature review. *Orthop Rev* 1987; **16**: 917–924.
- 6 MIRANDA FE, DENNIS JW, VELDENZ HC, DOVGAN PS, FRYKBERG ER. Confirmation of the safety and accuracy of physical examination in the evaluation of knee dislocation for injury of the popliteal artery: a prospective study. *J Trauma Inj Infect Crit Care* 2002; **52**(2): 247–252.
- 7 MARIN EL, BIFULCO SS, FAST A. Obesity: a risk factor for knee dislocation. *Am J Phys Med Rehabil* 1990; **69**: 132–134.
- 8 KENNEDY J. Complete dislocations of the knee joint. *J Bone Joint Surg* 1963; **45A**(5): 889–904.
- 9 SNYDER WH. Popliteal and shank arterial injury. *Surg Clin North Am* 1988; **68**: 787.
- 10 TOMINAGA GT, CONNOLLY JE, WILSON SE. Bilateral popliteal artery injury from bumper crush injury [Case Report]. *J Trauma Inj Infect Crit Care* 1996; **40**(2): 311–313.
- 11 GABLE DR, ALLEN JW, RICHARDSON JD. Blunt popliteal artery injury: is physical examination alone enough for evaluation? [Case Reports]. *J Trauma Inj Infect Crit Care* 1997; **43**(3): 541–544.
- 12 HAGINO RT, DECAPRIO JD, VALENTINE RJ, CLAGETT GP. Spontaneous popliteal vascular injury in the morbidly obese. *J Vasc Surg* 1998; **28**(3): 458–462. discussion 462–3.
- 13 TOMAINO M, DAY C, PAPAGEORGIOU C, HARNER C, FU FH. Peroneal nerve palsy following knee dislocation: pathoanatomy and implications for treatment. *Knee Surg Sports Traumatol Arthrosc* 2000; **8**(3): 163–165.

Accepted 1 May 2003